Subject: glowbugs V1 #204
glowbugs Friday, December 12 1997 Volume 01 : Number 204

Date: Thu, 11 Dec 1997 11:46:48 EST
From: EWoodman <EWoodman@aol.com>
Subject: Re: Parallel Plate Capacitors

I don't have anything intelligent to add to the discussion except that I use Hamcalc to roughly calculate capacitance. I've made up a few homebrew caps and it works pretty well. The caps made from double sided pc board were just cut and try. Had no idea for sure what the dielectric material would be. A piece of glass works well sandwiched between two pieces of singe-sided board. With the copper side against the glass, the board on the outside provides some insulation. I've had some fun just trying different combinations and hooking them up to my meter to see what I get.

Eric KA1YRV

Date: Thu, 11 Dec 1997 20:36:01 +0100
From: Jan Axing <janax@algonet.se>
Subject: Re: Regennies, etc..

Ken Gordon wrote:
>
> > If we can determine the relative dielectric constant for typical glass, we
> > can calculate the capacity, perhaps capacity per sq. inch with a given
> > glass thickness. I'll look in some books here and see if I can find something.
>
> Thanks, we await the results of your research.
>
> Ken

Well, Barry has already presented the formulas and some dielectric constant data so I will not repeat it here.

>From the books I found glass to have a dielectric constant between 5 and 16 depending on quality. Glass will withstand voltages around 12 to 20 kV per millimeter thickness so the glass plate capacitor voltage rating will mostly be limited by the way it's built, not the glass itself.

A capacitor with 1 sq. inch plates and 1/8 inch glass will have a capacitance of around: (using Barrys figures)
Quartz glass: 7 pF
Pyrex: 8.7 pF
Soda-lime: 15 pF
Dry air: 1.8 pF

With 2 mm glass:
Quartz: 11 pF
Pyrex: 13.7 pF
Soda-lime: 23.7 pF
Dry air: 2.9 pF

Other materials:
FR-4 PCB: 16 pF (double sided fibreglass epoxy board, 1.6 mm, constant 4.5)
PTFE PCB: 15 pF (double sided PTFE (Teflon) board, 0.8 mm, constant 2.1)

Let's hope I didn't blow my math here... End effects ignored, expect slightly higher values.

The idea with EMC copper tape isn't bad at all, the adhesive on those tapes are conductive, thanks, Dexter.

Another idea popped up, why not make a variable capacitor with two plates and a piece of glass sliding between them? Perhaps something for a neutralizing cap?

Jan, SM5GNN

Date: Thu, 11 Dec 1997 18:17:28 -0500
From: "Ornitz, Barry L" <ornitz@eastman.com>
Subject: RE: Parallel Plate Capacitors

It depends somewhat on the manufacturer, but a good rule of thumb for FR-4 circuit board material (glass epoxy, flame retardant version of older G-10) is that the dielectric constant is between 4.3 and 4.8 for low frequencies. The material is fairly lossy at UHF and above but for HF use, it should make a wonderful capacitor material. The voltage rating for 0.062" board is high enough that no trouble should be encountered at reasonable glowbug power levels. Avoid the paper phenolic board unless you use the single-sided material at Ed suggests below.

73, Barry L. Ornitz WA4VZQ ornitz@tricon.net

>From: EWoodman [SMTP:EWoodman@aol.com]
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>the copper side against the glass, the board on the outside provides some
>insulation.

Date: Thu, 11 Dec 1997 16:00:13 -1000
From: Peter Demmer <ampruss@hits.net>
Subject: Re: Regennies, etc..

Jan Axing wrote:
>=20
> Ken Gordon wrote:
> >
> > 1) Does anyone have schematics of their OWN regennies which they migh=
t
> > mail to me for an SASE? Hand drawn is fine.
>=20
> I have mine on my glowbugs page http://www.algonet.se/~janax/glowbug.ht=
m
> It ain't quite ready yet but works fairly well.

> >
> > 2) Bob Keys mentioned "...glass plate capacitors..." in one of his po=
sts
> > on Hartleys.=20
> Jan, SM5GNN

Ken; I read some of the postings to your question concerning plate glass capacitors. IMMHO please check out any good book covering the history of glass making. You will be amazed how so few the number of years have passed since the industrilized world learned how to mass produce plain old plate glass. Also don't use plain window glass for anything above abt. 300 VDC with impressed RF. Take a look at the edge of any piece of common window glass. That slight green ting is copper or cooperic oxide. Pure glass is very expensive. If your determned to follow this line of construction, check out virgin TEFLON=99.
Concerning the Reginny ckts, The best I have come up with is the one in the 1945 edition ARRL Handbook, pg. 240 thru pg 242. Its the super gainer 2 valve, regen, superhet. The reason I suggest it is you can build your oun IF transformer, it fits in an inverted aluminum bread pan (vice a breadboard), utilizes the throttle regenny control (C2) and a relitive LV pwr supply. The 1.5vdc bias battery has lasted for years.=20
Any news on the 813 Ham Tips yet? I will be sending you a care package on the "Double M Special" transmitter in a few days so let me know via e-mail if you are interested in the ARRL 1945 Regenny receiver. When you get the xmitter schematics, just think 1625s or better yet 811As.=20
While awaiting the RCA Ham TIPs Dec 1938 era, Im already making up the coils. I spoke with Francises again and he told me he never used crystals until he had earned enough to buy and build up a Johnson Ranger. He used this circuit and a 50TH. Have a good week Aloha,
Peter

Date: Thu, 11 Dec 1997 18:30:38 -0800 (PST)
From: Ken Gordon <keng@uidaho.edu>
Subject: Schematics...again...

I have added the Jones "One Tube" regenny to the pile. Still have not added links back to the home page, but will.

Again, the URL is:

http://www.mines.uidaho.edu/~keng/

to start with.

Ken W7EKB

Date: Thu, 11 Dec 1997 16:36:40 -1000
From: Jeffrey Herman <jeffreyh@hawaii.edu>
Subject: Schematics...again... (fwd)

Forwarded message via Jeff KH2PZ / KH6

From: Ken Gordon <keng@UIDAHO.EDU>
To: Old Tube Radios <boatanchors@theporch.com>

I have added the Jones "One Tube" regenny to the pile. Still have not added links back to the home page, but will.
Again, the URL is: http://www.mines.uidaho.edu/~keng/ to start with.
Ken W7EKB

Date: Thu, 11 Dec 1997 22:10:20 EST
From: EWoodman <EWoodman@aol.com>
Subject: Pseudo Audio Xfmr

I was sitting here trying to figure out where I could find a small replacement audio output transformer. That is...without ordering one and spending money. Something of which I have very little of at the moment and certainly none to spare on radio gizmos. Years ago I had been told not to even bother ever trying to use any type of power transformer for audio frequencies. So I never did. But....I've been sitting here eyeing a couple of small transformers, one for 6.3v and another for 5v. I started thinking. Turns ratios of 20:1 and about 24:1. What does that work out to If you assume about 8 ohms for the low side? It turns out to be somewhere around 5000 ohms for 24:1 and 3500 for 20:1. Not bad. Dug through the tube manual to look up a 6V6 for class A audio. The plate load runs around 5000 ohms at about 2-4 watts output. Or at least close enough. Then I checked a small audio output transformer that I dug out of an old tv set years ago. I fed in some low voltage ac on the low side and guess what I ended up with.....a turns ratio of about 24:1. It all sounded good to me so I wired in the 5v filament transformer. It works, sounds pretty good, and has good volume. Now granted, I'm sure a power transformer doesn't have the kind of frequency response that a good audio transformer does but is there something wrong with using one in a pinch as long as the plate voltage on the high side is fairly low?(In my case it was only 180v) Especially if you're only concerned with communication use and not high fidelity? Makes you wonder what the difference is between a cheapo audio transformer and a filament transformer. I also tried the 6.3v xfmr on the output of my 2 stage, choke coupled, regen running only 36 volts. Normally I use high impedance phones and get enough volume on strong stations to almost be uncomfortable. With the filament transformer and 8 ohm phones there is more than enough audio.

I'm sure I'm not the first one to try some of these for audio, so what's the catch?

73   Eric   KA1YRV

Date: Thu, 11 Dec 1997 21:03:01 -0800
From: "John Burch" <occupant@ns.net>
Subject: Want small power Xfmr...

Thursday 12-11-97
Rocklin, CA 95677

Howdee to all of you with solder on your pants cuffs...

I'm looking for a small transformer with two secondary
windings that will be used in a stand-alone VFO power
supply.

One secondary for the filaments (6.3 VAC or 12.6 WITH
center tap!) at an amp or two, and the other winding to
provide just about anything over 150 VAC, but not too
high. The power transformer out of my favorite Muntz
TV would be WAY overkill, as I'm sure you'll agree.

So something small and light weight; not too much in
the way of a high voltage secondary, kinda like the
administration now in power.

Thanks de John WB6GHA (formerly WN6GHA)
occupant@ns.net
..

Date: Thu, 11 Dec 1997 21:45:09 -0800 (PST)
From: John Kolb <jlkolb@cts.com>
Subject: Re: [BitBucket] Want small power Xfmr...

On Thu, 11 Dec 1997, John Burch wrote:

> I'm looking for a small transformer with two secondary
>
> One secondary for the filaments (6.3 VAC or 12.6 WITH
> center tap!) at an amp or two, and the other winding to
> provide just about anything over 150 VAC, but not too

Keep an eye out for a filament transformer with two primarys
for use on 110 or 220. You can use one primary alone for 110 V
with somewhat derated current ratings and use the second pri winding
for a secondary. Should give 150 V DC with light loading.

John Kolb KK6IL

Date: Fri, 12 Dec 1997 00:43:13 -0500
From: JMcAulay <jmc@qnet.com>
Subject: Re: Want small power Xfmr...

At 09:03 PM 12/11/97 -0800, you wrote:
>Thursday 12-11-97
>Rocklin, CA 95677

[Appropriate extraneous stuff removed by Snip-O-Ganza]

>I'm looking for a small transformer with two secondary
>windings that will be used in a stand-alone VFO power
>supply.
>
>One secondary for the filaments (6.3 VAC or 12.6 WITH
>center tap!) at an amp or two, and the other winding to

>provide just about anything over 150 VAC, but not too
>high.

Hi, John:

How 'bout considering a couple of the RatShack 6.3 volt transformers, running one backwards from the LV secondary of the other to get the HV? With a diode bridge and a cap input filter, you should get around 150v or so for B+, with surely enough current capability for a small VFO. And it'd be pretty cheap; aren't they around $3 a copy? Pretty small, too.

73
John WA6QPL@amsat.org

Date: Fri, 12 Dec 1997 12:21:01 +0100
From: Jan Axing <janax@algonet.se>
Subject: Re: Pseudo Audio Xfmr

EWoodman wrote (in part):

> Especially if you're only concerned with communication use and not high
> fidelity? Makes you wonder what the difference is between a cheapo audio
> transformer and a filament transformer.

The difference is the air gap in the audio transformer. The DC current will reduce the primary inductance of the filament transformer, perhaps even saturate the core. The low frequency response will drop with severe distortion as a result. If you can restack the core an air gap is easy to obtain. The thickness of the air gap should be a maximum of, say, a matchbook paper. A piece of a typical QSL card is just about right. Another rude way is to cut the two outer legs of the core with a hacksaw but will in my opinion result in a too wide gap and sore fingers, core iron is hard!

The next difference is the winding. A good audio transformer is section wound to keep the leakage inductance down which extends the high frequency response but I doubt the el cheapo irons are wound this way. Also, the primary inductance in a filament transformer is probably lower but in these applications probably not important. Another issue is the phase response but only if there is a global feedback with the transformer in the loop.

The air gap is not needed in a push-pull transformer.

73
Jan, SM5GNN

Date: Fri, 12 Dec 1997 08:25:10 -0600
From: w5hvv@aeneas.net (Roderick M. Fitz-Randolph)
Subject: Hartley Plate Choke

I am in the process of building a VT-4-C (211) Hartley Oscillator transmitter for 80 meters (but want to have the ability to go to 160 meters) and have most of the components assembled, however, I would like to make the RF choke and want to make it out of small

gauge magnet wire wound on a wood dowel. Does anyone have any
suggestions as to the size of wire, diameter of the choke (single
layer wound) and the length (or turns)that would be suitable for
40, 80, and 160 meters?

Your suggestions gratefully received.

Rod, N5HV
w5hvv@aeneas.net

Date: Fri, 12 Dec 1997 11:01:30 -0500
From: bgriff@develcon.com (Bill Griffith)
Subject: Re: [BitBucket] Want small power Xfmr...

>On Thu, 11 Dec 1997, John Burch wrote:
>
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>for use on 110 or 220. You can use one primary alone for 110 V
>with somewhat derated current ratings and use the second pri winding
>for a secondary. Should give 150 V DC with light loading.
>
>John Kolb KK6IL
>

 Ditto those often-overlooked linear computer-type power supplies (note :
linear, not the switchers used in PC's). The transformers in the 35W or 65W
units often have a second separate primary. This is externally wired in
parallel with the first primary for 110VAC operation, or in series for
220VAC operation, but can be used for generating B+.
 The secondaries usually have one or more 8V or 16VCT windings for the
+5VDC/-5VDC outputs, and one or more 16V or 32VCT windings for the +/-12VDC
outputs - perfect for running the odd-voltage heaters on those old colour-TV
tubes in your junk-box (8JV8's, 17BF11's, 18GV8's, etc.).

Happy glowbugging!

Bill Griffith VE3WGX

Date: Fri, 12 Dec 1997 12:53:49 -0500
From: "Ornitz, Barry L" <ornitz@eastman.com>
Subject: Glass Dielectrics

Where do folks come up with this stuff? =20

Copper in glass colors it a reddish brown - look carefully around the
glass-to-metal seals in a miniature to see this. The green color in
glass is normally iron. The original Coke bottles were made from a high

iron content glass. =20

Instead of looking in history books about glass making, I suggest folks look in scientific reference books about glass properties. =20

Ordinary window glass is soda-lime glass and it is very similar in composition to the glass used for small receiving tubes. Borosilicate glass is used for transmitting tubes; cooks know it as Pyrex. Pure quartz, usually under the trade name of Vicor, is often used in X-ray tubes.

The dielectric breakdown strength of glass is highly dependent on temperature. When glass becomes hot enough to sag or deform, it becomes a good ionic electrical conductor. But at room temperature, it is an excellent insulator. Small bubbles in glass do decrease the breakdown voltage due to field concentration effects (and air has a lower breakdown voltage too).

For ordinary soda-lime glass, Knoll (1) lists the breakdown voltage as 16 kV at 1 mm thickness. Borosilicate glass can handle 16 kV at only 0.6 mm thickness. Rosebury (2) presents a graph of dielectric breakdown voltage (one minute life for 2 mm thickness at 60 Hz) as a function of temperature for three grades of Corning glasses. The Arrenhius relationship between temperature and conductivity is clearly shown in this graph. Littleton and Morey (3) is probably the most definitive reference, although Retzow (4) has also published in this area. As for polytetrafluorethylene, it is much more expensive than borosilicate glass (but less so than Vicor, but then PTFE is limited to a temperature of less than 200 C). PTFE has a dielectric strength of 15.7 to 19.7 KV for 1 mm thickness (5).

73, Barry L. Ornitz WA4VZQ ornitz@eastman.com

(1) Knoll, M.,"Materials and Processes of Electron Devices", Springer-Verlag, Berlin, 1959.
(2) Rosebury, F.,"Electron Tube and Vacuum Techniques", Addison-Wesley, Reading, MA, 1965.
(3) Littleton, J.T. and G.W. Morey, "Electrical Properties of Glass", London, 1933.
(4) Retzow, U., "Die Eigenschaften elektrisher Isoliermateriallen in graphischen Darstellungen", Berlin 1927.
(6) Brandrup, J. and E.H. Immergut, "Polymer Handbook", John Wiley, New York, 1975.

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>glass capacitors. IMMHO please check out any good book covering the
>history of glass making. You will be amazed how so few the number of
>years have passed since the industrilized world learned how to mass
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>anything above abt. 300 VDC with impressed RF. Take a look at the edge =
of
>any piece of common window glass. That slight green ting is copper or
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>

End of glowbugs V1 #204
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